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United States
Department of
Agriculture

Forest Service
Southern Region

Conservation Reserve Program Reviews, 1987 and 1988

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USDA Forest Service and Southern State Foresters
in cooperation with
Agricultural Stabilization and Conservation Service,
Soil Conservation Service, and Cooperative Extension Service

Forestry Report R8-FR 10

July 1988

Metric Conversions

1 quart = 0.95 liter
1 gallon = 3.78 liters
1 inch = 2.54 centimeters
1 liter = 2.1 pints

USDA Forest Service
1720 Peachtree Road NW
Atlanta, GA 30367-9102

Purpose and Scope of Reviews

More trees are being planted than at any time since the 1950's, under the Conservation Reserve Program (CRP) authorized by Public Law 99-198. How well is this work proceeding—and what improvement can we suggest at this point? To find the answers, tree planting and quality were reviewed in the 13 southern States during February, March and April of 1987 and 1988. These reviews sought to:

1. Determine how well tree planters conformed with the "best planting practices" as specified by the profession.
2. Emphasize quality seedling care, handling, and planting.
3. Reinforce awareness that forest regeneration is a total integrated system that includes proper seed source and nursery practices, appropriate and speedy delivery of trees to planting sites, proper planting techniques, and decreased mortality due to improper planting.
4. Exchange among the various State forestry agencies information, techniques, and policies that lead to successful efforts.
5. Bring about a steady and significant improvement in the quality of tree planting in the South.

The results of the reviews reflect samples taken to represent tree planting under the CRP throughout the South.

SAMPLE SIZE

	Number	
Unit	1987	1988
States	13	13
Counties	42	38
Farms	84	86
Plots	469	480

Summary

Improvement in planting quality under the CRP Program in 1988 is significant, due largely to a high degree of support shown by the southern State forestry agencies. This support is apparent for both the concept of the program and for the effort expended by field personnel responsible for implementation.

Field reviews in 1987 and 1988 generated substantial attention to quality of planting (figure 1), as well as for care and handling of the seedlings from nursery to planting site. The guidelines and forms used in the reviews appear in appendix A. State Foresters' willingness to implement suggested standards and technical guidelines is also instrumental in the program's success.

Figure 1.–The Virginia CRP Review Team makes an above-ground inspection of tree planting quality.

Specific State agencies' and cooperators' accomplishments and implemented policies leading to the program's success are numerous. They include:

—an increase in personnel and their expertise.

—more training of vendors and State field personnel in what is needed to assure quality tree planting, and more training aids and tools to perpetuate the resulting awareness.

—a standard policy of checking both above-ground and below-ground seedling conditions when judging planting quality.

—more emphasis by State forestry agencies on the care and handling of seedlings after they leave the nursery.

—recognizing subsoiling as a necessary site-preparation action for certain planting sites.

—increased installation of cold storage facilities at distribution centers.

—more pre-work conferences with the tree planters (vendors), and more on-site inspections of in-progress planting efforts.

Specific improvements of 1988 planting efforts over 1987 efforts include:

—a 31-percent decrease in trees planted unacceptably resulted in an increase southwide–from 65 percent to 76 percent of trees correctly planted.

—a significant improvement in quality of planting done by vendors who received training in correct tree planting techniques, and equally interesting, a significant improvement in tree planting quality by vendors who did not receive such training. Apparently the word is getting out that quality planting is expected and vendors are subject to complying with planting standards.

—an additional improvement in tree planting quality by those vendors whose efforts were inspected by field foresters during planting (figure 2).

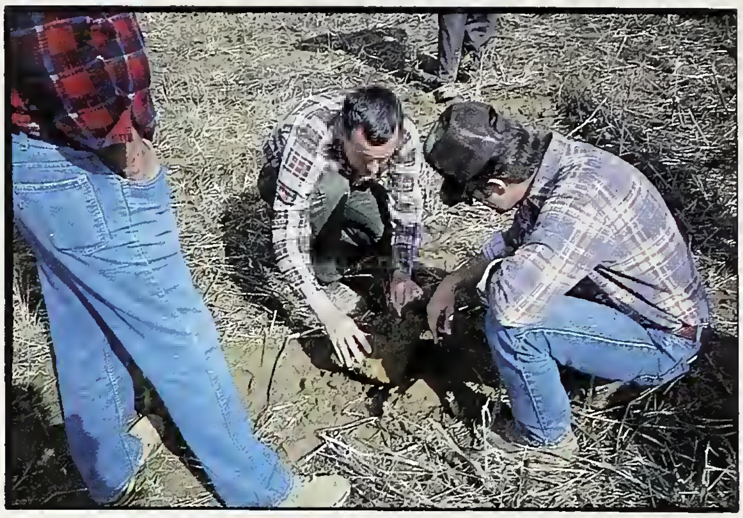

Figure 2. – Quality of planting practices below ground is examined as part of the effort to obtain optimum survival of seedlings.

—a 37-percent reduction in unacceptable, below-ground seedling conditions (a result of digging up trees as a part of on-site inspections),

—a substantial reduction in all unacceptable seedling conditions, except "cull" and "multiple trees" categories.

During the 1988 CRP program in the South, State forestry agencies helped plant trees on 888,000 acres of highly erodible marginal crop land—an 82-percent increase in acres planted over 1987. Seventy-six percent of the seedlings were planted acceptably. This was a substantial improvement over the 1987 accomplishments. See figure 3. The acres planted nearly doubled, up from 478,000, and the percent of trees planted acceptably rose 11 percentage points, up from 65 percent. The trees were measured against a high planting-standard. Many trees recorded as unacceptably planted could survive unless stressed by drought or other adverse conditions.

Eleven of the 13 southern States improved their percent of acceptably planted trees between 1987 and 1988. See figure 4. One State did not change and one suffered a reduction. The two States that had the smallest percent of acceptably planted trees during 1987 showed the greatest percentage point improvement during 1988.

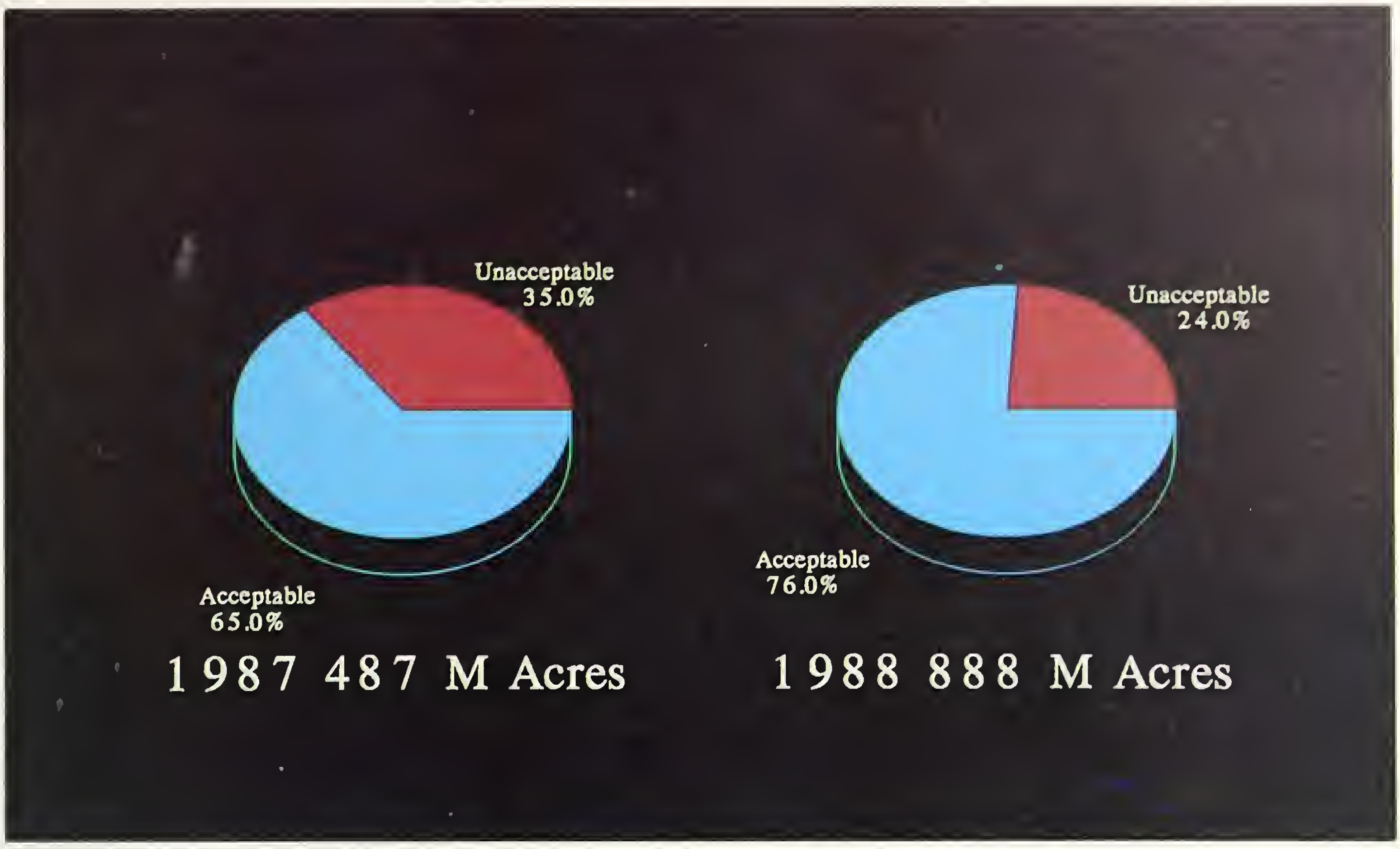

Figure 3.–Percent of trees planted acceptably, 1987 and 1988.

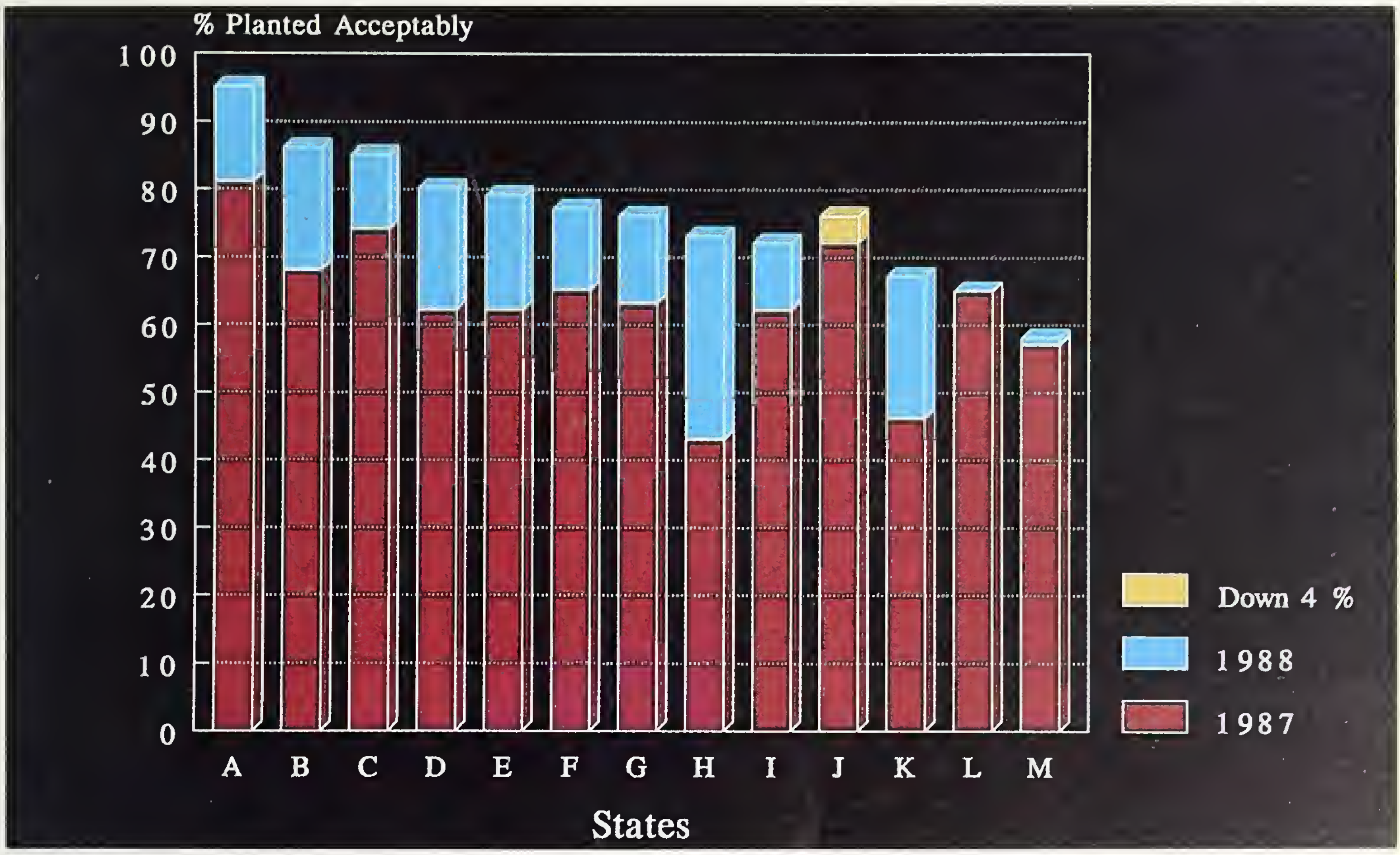

Figure 4.–Percent of trees planted acceptably in each of 13 States, 1987 and 1988.

Seedling conditions above and below ground that made plantings unacceptable were reduced significantly between 1987 and 1988. The 35 percent of unacceptable plantings in 1987 was reduced to 24 percent in 1988. See figure 5.

This 24 percent of unacceptable plantings was divided equally between above and below-ground defects. See figure 6. Cull trees and shallow planting were the biggest above-ground defects. L-root was the major below-ground defect. Cull trees with a root length of less than 5 inches was the second biggest below-ground problem.

All above ground planting defects declined in 1988 over 1987 except "cull" and "multiple seedlings". See table 1. The primary reason for seedlings being designated "cull" was being undersized at the time of lifting from the seedbed in the nursery. This indicates a need for increased monitoring of nursery operations by the state foresters. "Multiple seedlings" is more than one seedling placed in the planting slit. Unacceptable seedling conditions below ground declined in every category.

Table 1.—Unacceptable condition categories as a percent of all trees planted, 1987 and 1988

Above-ground conditions	Percent 1987	Percent 1988	
Too deep	2.1	1.3	
Too shallow	4.1	2.2	
Loose	2.1	1.1	
Leaning	4.6	1.5	
Cull	2.6	4.7	(increased)
Multi-seedlings	.5	1.2	(increased)
Total	16.0	12.0	
Below-ground conditions			
L&J roots	13.5	9.7	
Leaning	1.7	.5	
Culling	2.8	1.4	
Debris	1.0	.4	
Total	19.0	12.0	

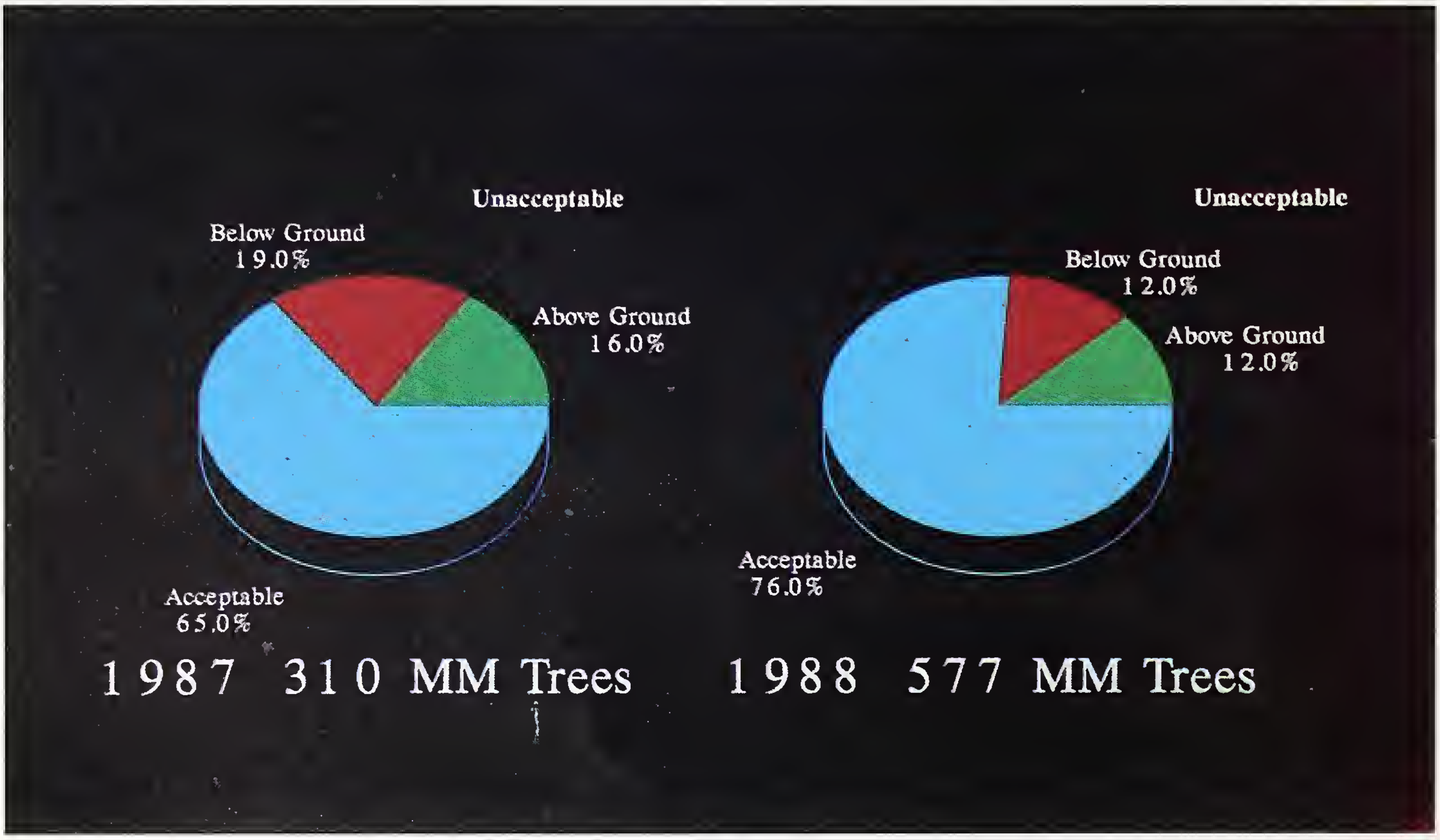

Figure 5.–Unacceptable planting conditions above and below ground, 1987 and 1988.

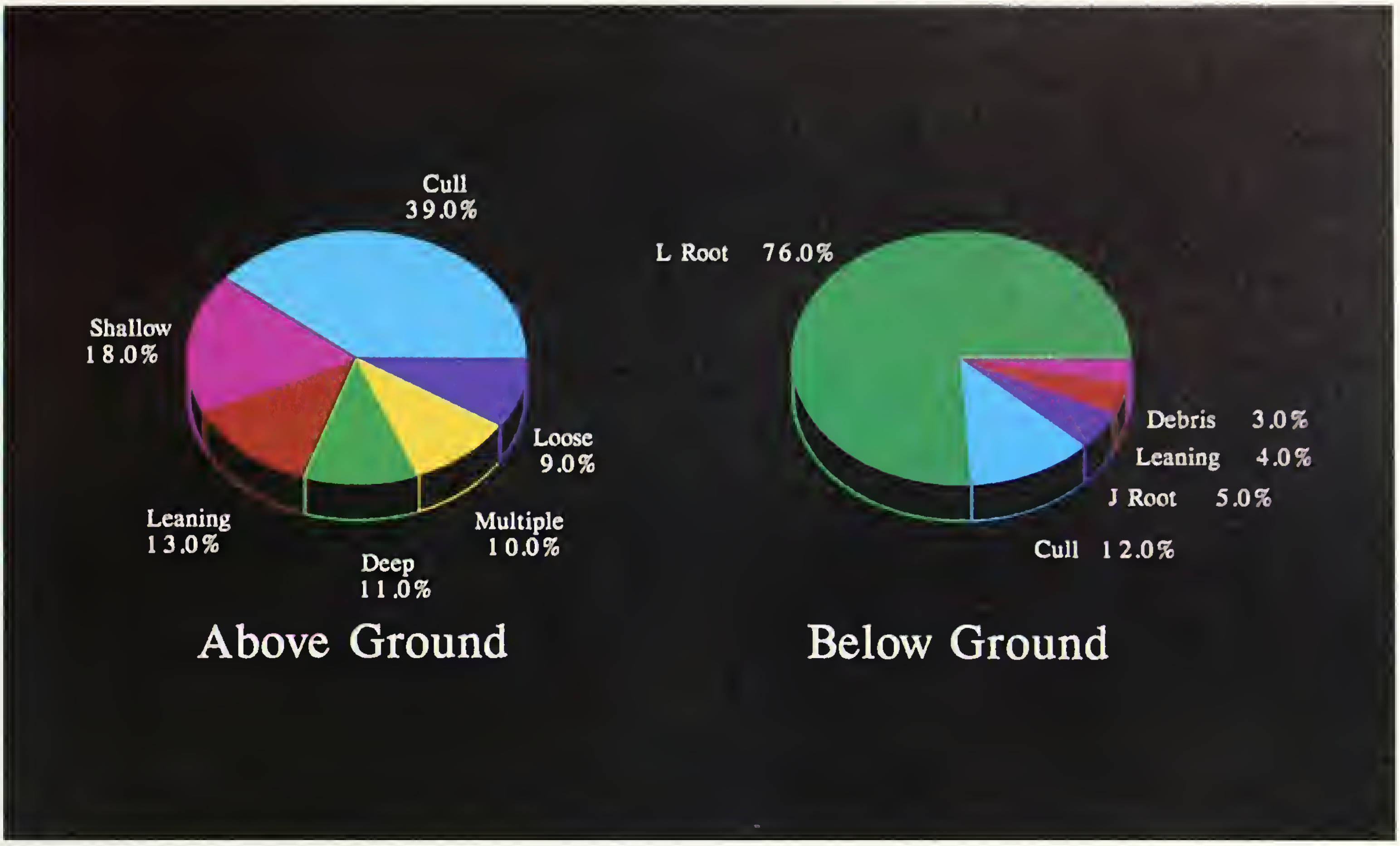

Figure 6.–Above and below ground conditions, 1988.

Two review criteria, vendor training and vendor training recognition (certification, etc.), appear to have a positive influence on tree planting quality. During both 1987 and 1988 vendors **with** this training/recognition showed improvement in the percent of trees judged to be acceptably planted when compared to trees planted by vendors who did not meet these criteria. See figure 7. This had a ruboff effect on those vendors **without** or who did not meet these two criteria, since the percent of trees planted acceptably by them was also greater in 1988 than in 1987.

Two other criteria, pre-work conference with vendors and on-site inspection during planting, also appear to have a positive influence on tree planting quality, especially during 1988. During 1987 these criteria seem to have had a slight to moderate influence, whereas in 1988 they had a significantly large influence. See figure 8. And again, the "withouts" during 1988 did as well or better than the "withs" during 1987.

When viewed together, the 1987-1988 history of these four criteria convey a strong message: Close association with and monitoring of those planting the trees, by State field foresters, State specialists, and their Federal counterparts, have significantly influenced the quality of tree planting. Furthermore, there appears to have been a ripple effect between 1987 and 1988, as if other vendors (tree planters) had gotten the word that the quality of their efforts would be monitored. These observations seem to justify a continuation of face-to-face CRP review efforts. See figure 9.

Performance improved in six categories during the 1988 planting season, as shown in figure 10.

Subsoiling of the site before planting did not change between 1987 and1988. Subsoiling was carried out on only 7 percent of the sites. A 1988 review question asked if subsoiling needed to be done; 24 percent of the respondents said yes. Therefore, there appears to be a need for efforts to get it done—and more effort spent finding out if it's really needed.

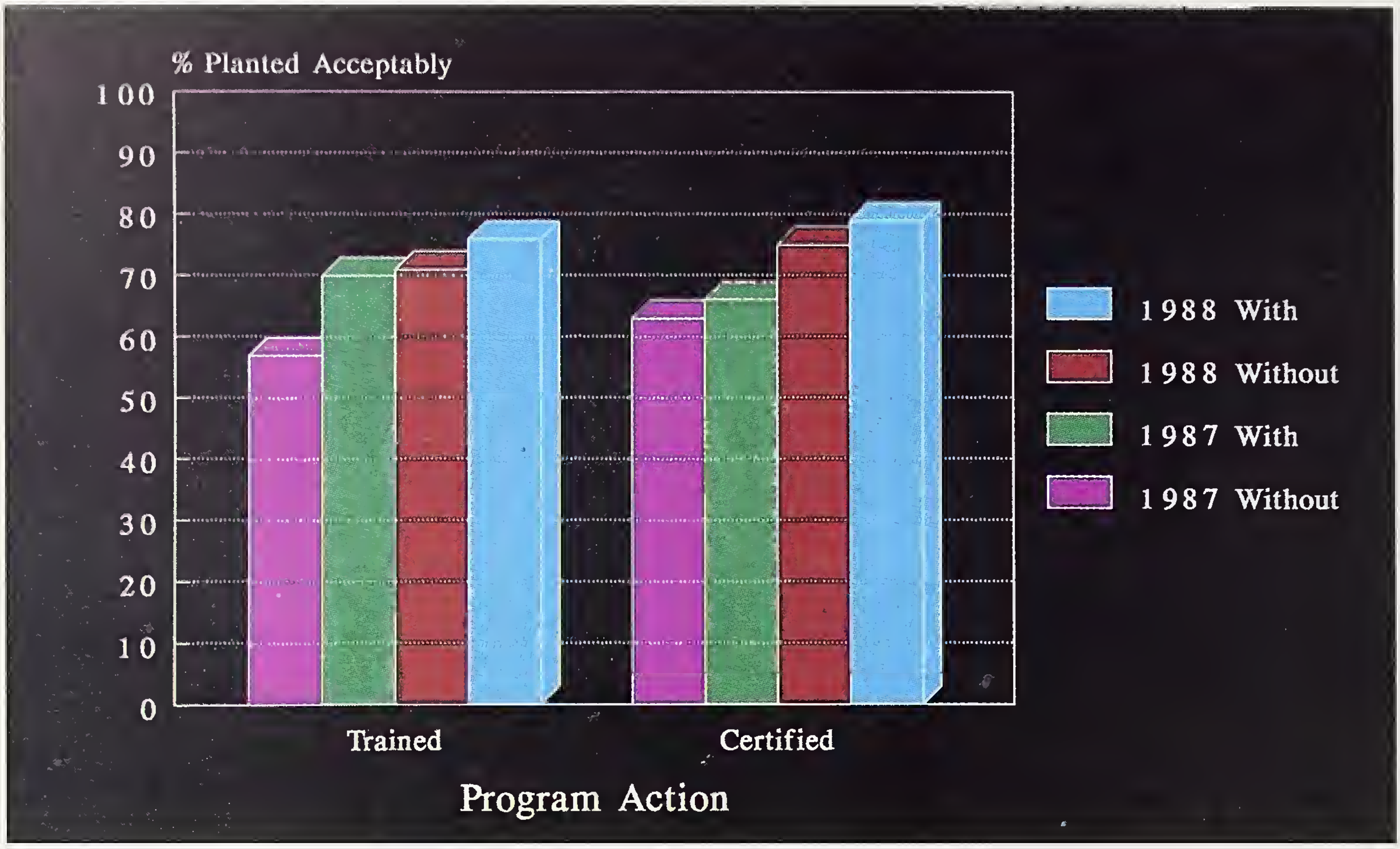

Figure 7.–Trees planted acceptably, showing the influence of training and certification, 1987 and 1988.

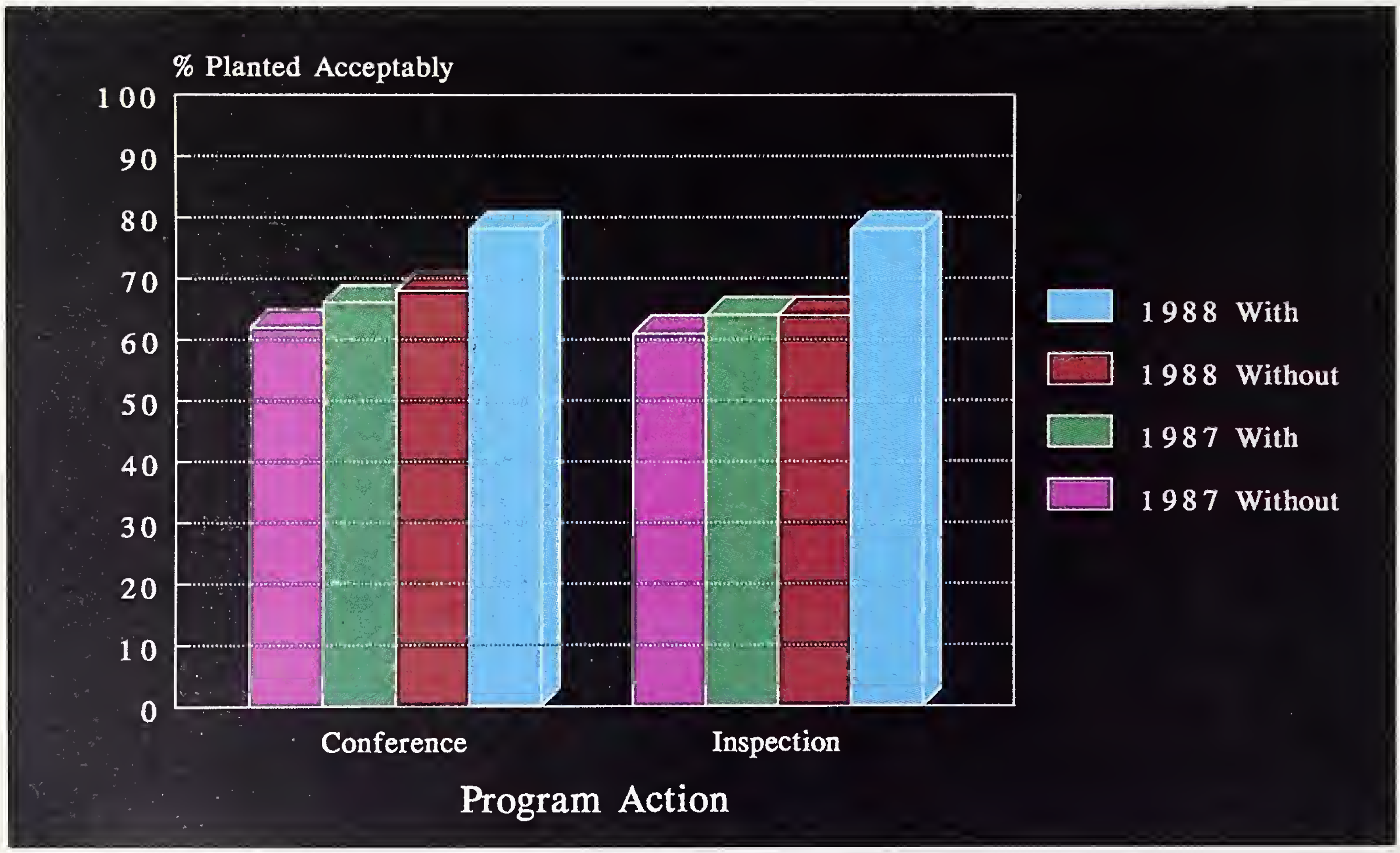

Figure 8.–Trees planted acceptably, showing the influence of conferences and inspections, 1987 and 1988.

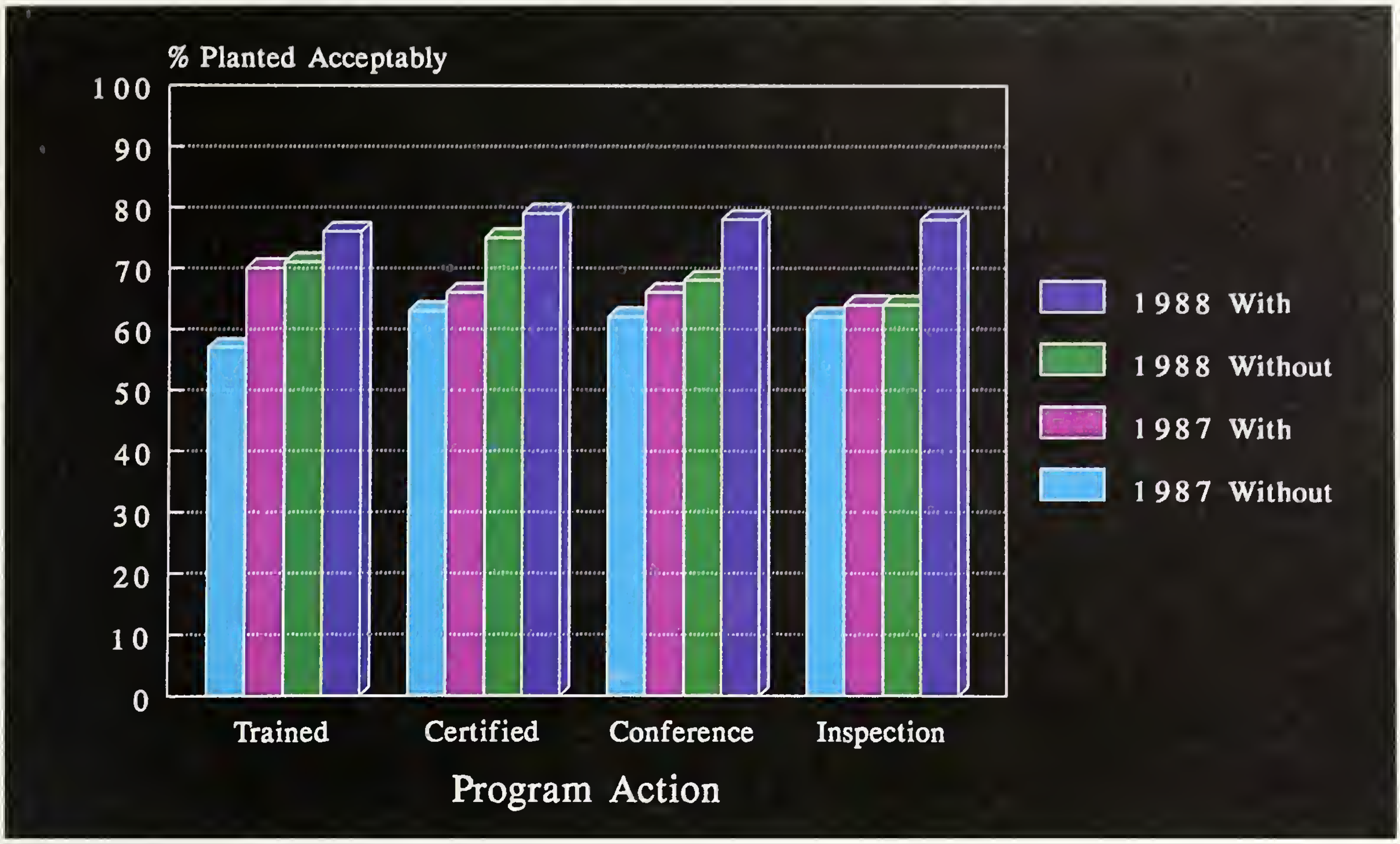

Figure 9.–Trees planted acceptably, showing the influence of four program actions, 1987 and 1988.

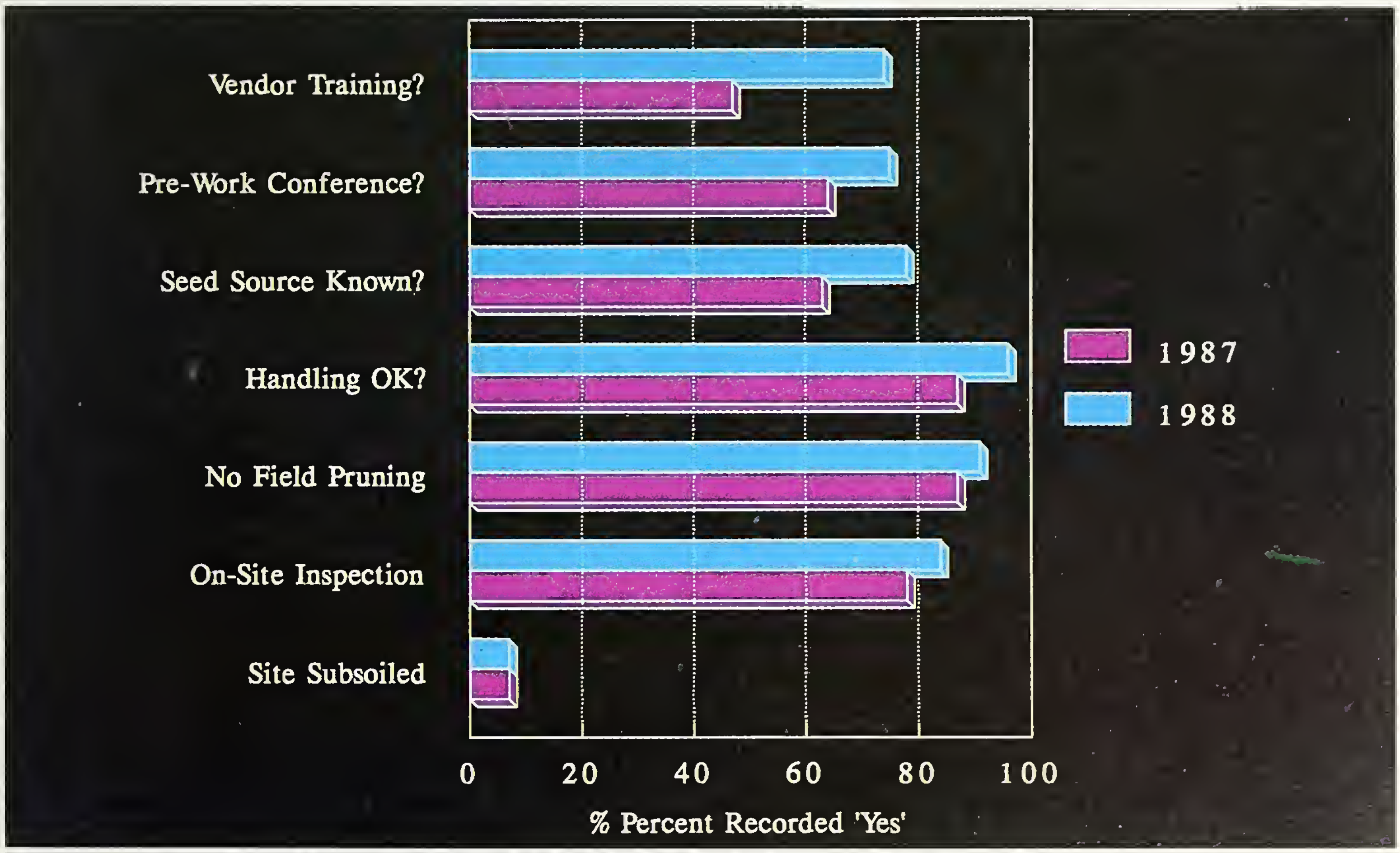

Figure 10.–Positive replies to selected criteria, 1987 and 1988.

When trees on acres needing subsoiling are compared with trees on acres that were subsoiled, 8 percent more trees were acceptably planted on the latter sites. See figure 11. Lack of subsoiling is part of the reason why so many plantings are judged unacceptable because they are too shallow and suffer L- and J-root conditions.

From the limited data available on dibble and hoedad planting, these two methods appear to trail in quality behind machine planting. From 1987 to 1988 machine planting increased its acceptable measure from 64 percent to 79 percent, whereas dibble planting improved from 64 percent to 69 percent, and hoedad planting improved only slightly, from 60 percent to 62 percent. See figure 12.

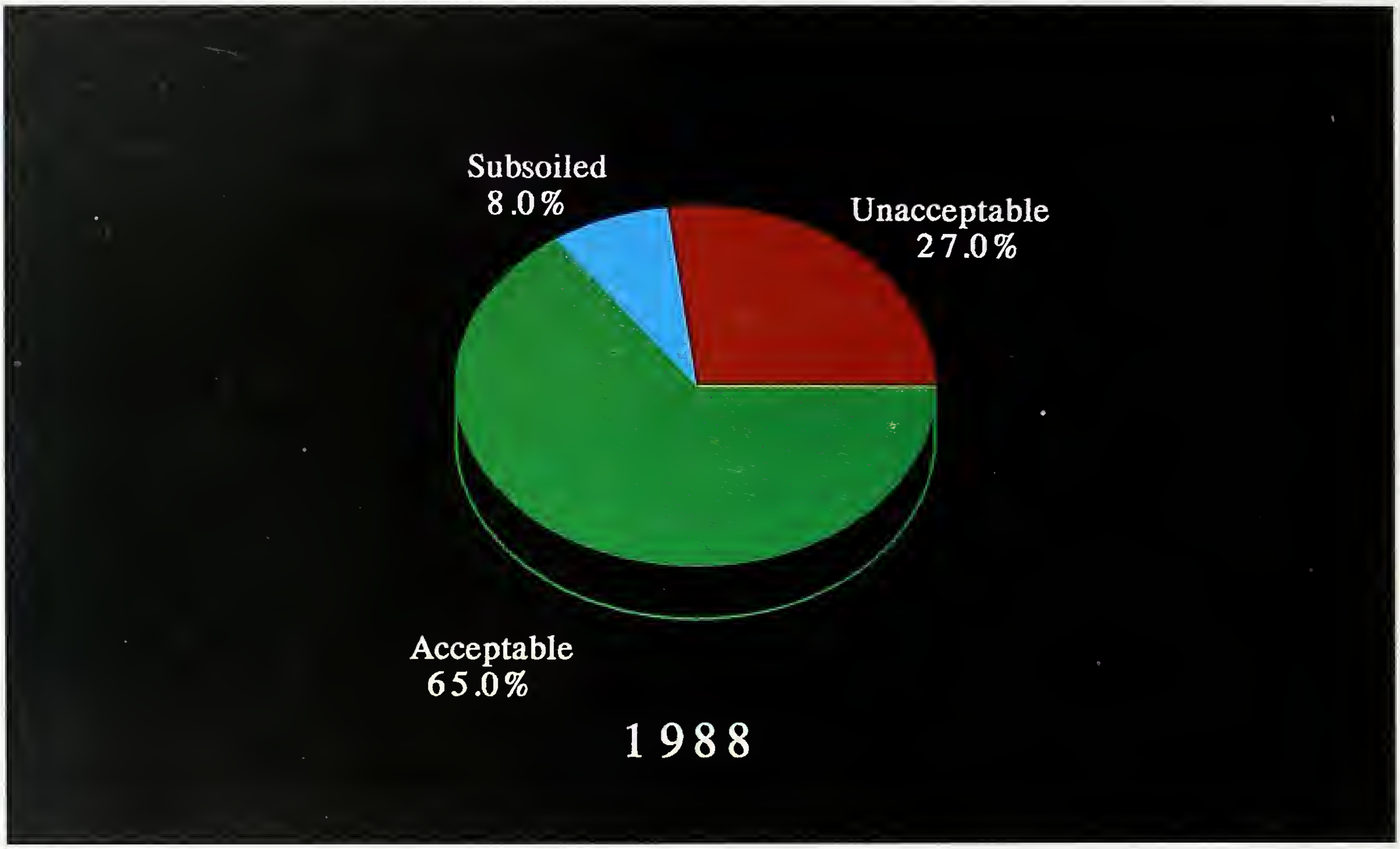

Figure 11.–Trees planted acceptably, showing the influence of subsoiling, compared to those needing subsoiling.

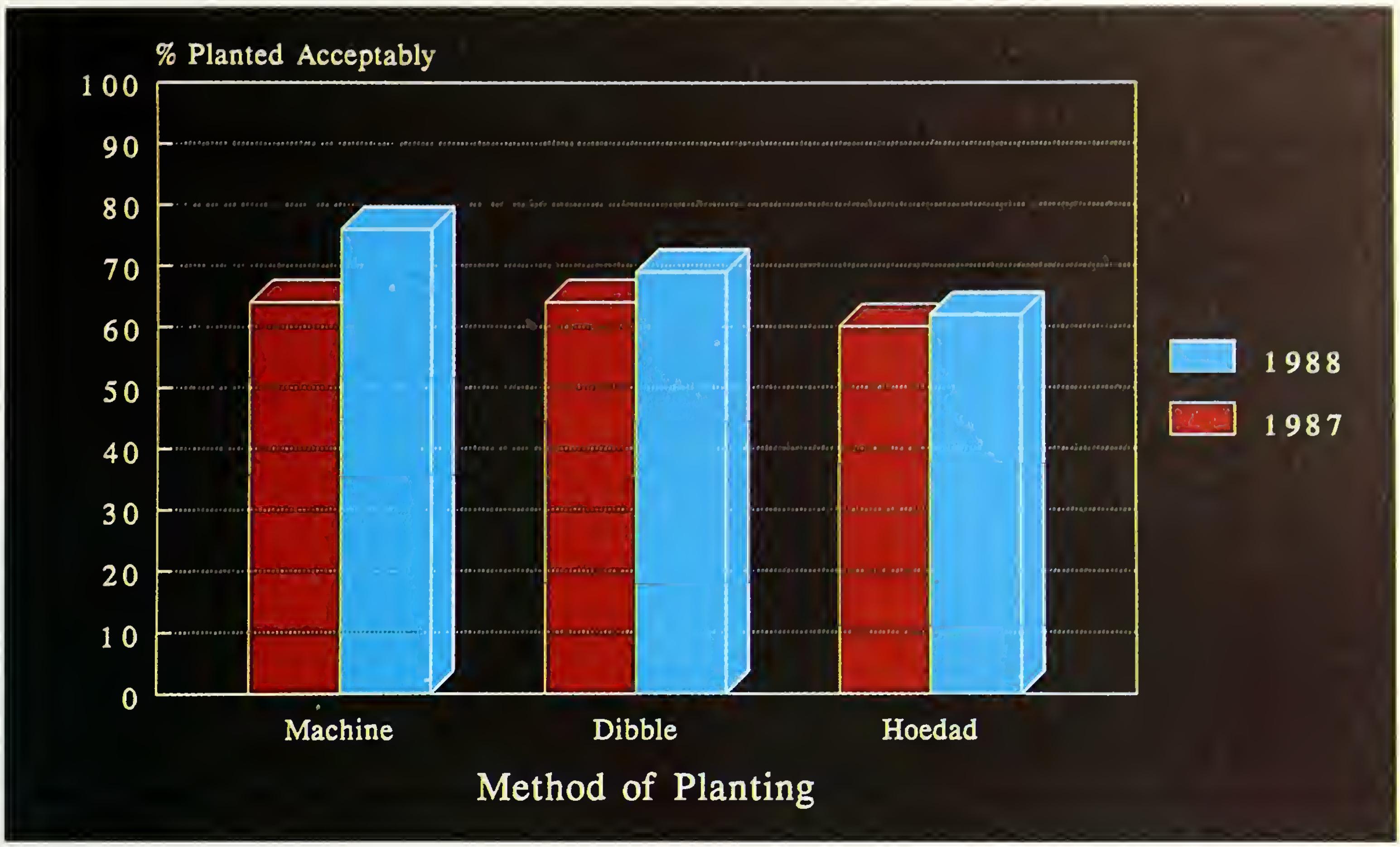

Figure 12.–Trees planted acceptably by machine, dibble or hoedad, 1987 and 1988.

CONCERNS AND RECOMMENDATIONS

Concerns	Recommendations
1) Cull seedlings appeared to be more prevalent in the 1988 plantings than in the 1987 plantings.	1) -Tighten up on nursery culling during packaging. -Encourage lower growing-densities in nursery beds. -Educate vendors and landowners to be more aware of culls in the seedlings they receive. -Train planters to cull out undersized seedlings at time of planting.
2) Care and handling of seedlings at the nursery, delivery to distribution centers and storage once they are there, appear to be improving. However, care and handling appear to be below standard in many cases after seedlings leave the distribution center and are waiting to be opened	2) -Continue to monitor and improve care and handling at nursery, during transportation to distribution centers and while in storage. Develop action plan for training vendors and landowners in the proper care and handling of seedlings from the time they receive the seedlings until they are planted.

Concerns	Recommendations
	-Continue to support the creation of appropriate storage facilities in the field. -Specify the person(s) responsible for seedling care and handling throughout the entire time seedlings are out of the ground, e.g., State personnel,vendors and landowners.
3) Subsoiling before planting is beneficial and necessary for some sites. Though some subsoiling was done in 1987, more is needed.	3) -Train field foresters (supervising personnel) in testing for and identifying hardpans. Where needed, specify subsoiling needs in planting prescriptions. Encourage ASCS to include subsoiling as a site preparation effort that will be recognized in CRP payment schedules.
4) On-site inspections of the planting process have increased the quality of plantings. However, not all planting sites are visited during the time planting is in process.	4) -Give high priority to on-site inspection visits while planting is in process. This is perhaps the single most influential action that can be taken to improve planting quality.
5) Much of the "too shallow" conditions existing in unacceptable planting result from planting machines that are not adjusted properly. Adequate depth control adjustment would reduce this unacceptable planting condition.	5) -Include procedures for planting machine adjustment in vendor training efforts. Train State field personnel to recognize this condition and to make planting machine adjustments. Subsoiling will also help this planting improvement effort.
6) Root pruning in the field still appears to be a problem. Elimination of this practice would benefit planting quality.	6) -Root pruning in the field would be reduced significantly if on-site inspections by State personnel were made commonplace.

APPENDIX A.–MEASURING TREE PLANTING QUALITY

INTRODUCTION

The survival of a planted tree seedling is dependent on many things. Before attempting to improve the quality of tree planting it is necessary to define quality planting and to be able to measure it. That is the purpose of this system.

This method of measuring tree planting quality has been used for a number of years by the USDA Forest Service on the Yazoo Little Tallahatchie Flood Prevention Project and more recently by the State of Texas. During the 1987 tree planting season, it was field tested successfully in every state in the southeast as part of an annual review for the Conservation Reserve Program.

The tools required are simple and inexpensive. A sharpshooter shovel, a chain 11.75 feet long with a loop at one end capable of fitting over the shovel handle, a soil thermometer and a clipboard. Total cost is less than the amount required to plant one acre. In large planting programs such as the CRP, the savings resulting from this investment can run into the thousands of dollars.

NURSERIES

The survival of seedlings is related to the accumulative effects of a long chain of events. Just as a chain is as strong as its weakest link, any one of the steps of tree planting from the nursery to the final inspection of the planting job can result in the mortality of the seedling. By the same token carelessness in several stages of the process can have an accumulative effect resulting in mortality. With the involvement of many individuals in the chain of events it is often hard to pinpoint the cause of trouble.

To highlight the importance of the tree nursery in the tree planting process it is recommended that a nursery be one of the earlier stops in any of the field reviews. Nursery reviews can better be held separately, but the purpose is to make the statement that the nursery operations are an important part of the process. In addition, it is important to get a feeling of the quality of the seedlings as they leave the nursery. Later as the trees are viewed in the field they can be compared to their original nursery condition.

It is recommended that a bale of seedlings be counted and culled. Culling can occur on the green chain at the nursery or in the field. The purpose of the count is not to determine if a bale marked 1,000 trees contains that many trees but to calculate the percentage of trees in the bale that are plantable. During the 1988 review we will be counting plantable trees and two kinds of culls.

Count the trees in a bale as you separate them into three piles, standard culls, Lateral Root Deficient trees and plantable trees. Count the two smaller piles and calculate the percentage in each category.

Standard Cull - top or roots less than 5 inches or root collar diameter less than 1/8 inch for loblolly pine or .4 inch for longleaf.

Lateral Root Deficient (LRD) - Trees not having 4 primary lateral roots that were 1mm or larger in diameter.

CARE AND HANDLING

While at the nursery it is good to observe how seedlings are being transported to the field. Are the transports refrigerated? Are the trees stored in satellite refrigerators near the planting sites? Do the non-refrigerated trucks have covers to shade the seedlings during transport? This is often a neglected area as the nursery manager considers his or her obligation filled when the trees leave the nursery in good condition, and the planters blame the nursery when they get stressed trees.

A second area of concern is how trees are being stored at the planting site. Are they shaded or insulated? Are they received in small batches that can be planted in a day or are they stockpiled by the week? Trees should be rotated and fresh. Use a soil thermometer to determine if the bales or bags are overheating.

PLANTING TYPES

Machine.—With the advent of the CRP much of the pine tree planting in the South is being accomplished by tree planting machines. Once adjustments are made this can be an effective tool. The main problems stem from improperly adjusted packing wheels, light machines incapable of breaking plow pans, and moving the machine forward too fast resulting in sweeping the trees into an L root.

Hoedads.—The hoedad has the most potential for being misused. Common problems associated with the tool are improper planting angles or leaning trees where the roots exceed 45 degrees from vertical. In heavy clay or rocky soils the depth of the planting slit is often too shallow. Several swings of the tool are required to achieve the proper depth and it is common to see trees crammed in shallow holes. Severe root pruning is often associated with the hoedad and reviewers should be alert for masses of roots near entrance roads to the field.

Dibbles.—With proper supervision the dibble can consistently plant a good tree. One common problem with the dibble is using worn tools which produce shallow holes.

SAMPLE DESIGN

Generally five to eight plots distributed randomly across a field should give the reviewer a good feeling as to whether the planting is good, bad or average. Marginal results may dictate taking additional plots to determine if the planting meets standards.

The most expensive part of the review will be travel time. Once the reviewers arrive at a farm, plot time usually runs 1/2 to 1 hour depending on the amount of discussion. Travel time between farms can be cut to a minimum by clustering samples in counties of high planting activity. It is recommended that a minimum of two counties be selected in different regions of the state and a minimum of six farms be sampled in each state.

It should be understood by the reviewers and the state reviewed that a sample of six farms does not give a statistically reliable estimate of the planting quality of a State. The main purpose of calculating scores is to aggregate the data across the South or to study differences in type of planting or program across the South.

SCORING A FARM

Once the field forms are filled out, they can be scored to determine the percent of trees that were planted correctly. The first calculation is to determine the percent of trees that are apparently planted correctly as far as can be determined by observing above ground attributes. A second sample is taken of the *apparently good trees.* This sample is less intensive because of the work required to dig up trees. The below-ground sample is determined by digging a minimum of three trees per plot. The trees should be *apparently planted correctly* and sampled from three separate rows. (This will require that at least one of the dig trees will fall outside the 1/100 acre plot.) The percent of trees planted correctly on a farm is equal to the percent of trees planted correctly above ground multiplied by the percent of trees planted correctly below ground. (Total % correct = above ground correct % X below ground correct %).

DEFINITIONS

One of the deficiencies last year was the variety in interpreting pass fail categories. Care should be taken this year to understand the definitions and ask questions to obtain complete answers where information is sketchy or unknown.

Case No.—This is a number assigned by the reviewer to the farm. For example, if six farms are sampled in a State case numbers would be 1,2,3...6. (Don't use ASCS or SCS case numbers.)

Acres—Acres planted that you examined or sampled on this farm.

Seed Source—Often the field foresters will not know the geographic source and will tell what nursery the seedlings came from. This information should be provided by the State management foresters or the nursery. The main purpose is a check off to force a discussion of seed source integrity. Carry the *Guide to Southern Pine Seed Sources* with you and have extra copies to leave with State management foresters.

Forester—This is the professional or technician who prepared the prescription or supervised the planting. If a district forester is sitting in an office and signing off on all the plans use the name of the technician or forester who was most involved in the-on-the ground operations rather than the signer of the plan.

Date Reviewed—Today's date, the date that the field measurements are being taken.

Date Delivered and Date Planted—These two dates are used to determine if fresh trees are being planted. Are trees being planted the date they are delivered to the vendor or does he or she stockpile them for a period, such as a week?

Handling—This will often be a judgment call when visiting a job that is not being currently planted. If the trees are fresh and green you can assume that handling was adequate. However, if one field shows stress while another field is fresh, handling is a prime suspect. Adverse weather should stress all the fields in a State.

Pruning—Roots should be 8 inches in length, and if any pruning is done to achieve that length it should be done at the nursery. Check "No" if no field root pruning has occurred or if field root pruning did not shorten the tap roots below 8 inches. If root balls are spotted around the field and roots are less than 8 inches in length check "Yes."

Trained Vendor—Several States have vendor certification programs with varying degrees of certification. At a minimum, to be considered a trained vendor, the contractor should have attended a formal training session in the last year where the State standards of quality planting were discussed.

Release Needed—Are the planted seedlings free to grow or will additional treatments be needed?

Prework field—This item is intended to show whether the forester or technician was present at the planting site the first day of planting to get the contractor off to a good start. Was he present at the start of the planting job on this particular farm to take care of any problems such as areas to be planted, adjustments to the planting machine or ability of machinery to break plow pans.

Prework office—If a forester was not present in the field at the start of the job, was there timely communication between the forester and the contractor as to what standards would be enforced, details specific to this particular field and planned times of start and finish?

Inspected—This item has to do with the forester or technician being present during the planting operation. Sometime during the planting operations on that farm did a forester or technician check the job? Checking the job for compliance the day after it had been planted would not qualify as being inspected. A prework conference would also count as an inspection but not visa versa.

Planting Plan Followed—Can they show you a written plan that calls for the treatment, spacing, etc., that you observe on the ground? If a forester changed or waived treatments were the Plans amended in writing?

Machine - Hoedad - Dibble—these three are a check off of the type of planting. If more than one type occur on the same farm, check "Yes." The other two should be checked "No."

Contour Planting—If area is machine planted, did the planting machine follow the contour to prevent erosion?

Adequate site preparation—Irrespective of what was called for in the prescription, was adequate site preparation accomplished? Are the trees free from competition? Was necessary subsoiling performed?

Subsoiling needed—Was there a plow pan in the top 10 inches of soil that could not be penetrated by the planting tools?

Subsoiled—Was the area subsoiled with a ripper or was the planting machinery heavy enough that the coulter broke through the plow pan in over 90 percent of the field.

Rx trees per acre—How many trees per acre were called for in the prescription? Usually, this must be calculated as it is stated in the form of a prescribed spacing. Its main use will be to compare it with the actual number of trees planted per acre to determine if extra trees are being wasted or planted to compensate for poor quality.

C = Cull Seedlings—Root collar less than 1/8 inch or either top or roots less than 5 inches in length for loblolly or 0.4 inches for longleaf.

D = Debris in hole—usually results from not clearing the planting spot to mineral soil when using a dibble or hoedad. Also can be used to tally trees being hidden in the planting slit.

E = Excessively deep—Terminal bud less than 3 inches above the ground line.

J = J-or U-rooted—tap root is turned back up.

L = L-rooted—tap root is perpendicular to vertical due to sweeping the trees while machine planting, or making shallow holes with dibble or hoedad.

M = Multiple trees in hole or slit.

N= Not packed properly—trees are too loose resulting from misadjusted packing wheels or not closing dibble holes properly. Test by tugging on three needles.

S = Shallow Planted—Root collar and lateral roots are visible above the ground line. This does not apply to excessively long laterals that will not fit in a properly dug hole, as long as the rest of the roots are properly planted.

T = Twisted or balled—This is similar to J-rooting, but results from trying to cram a full root system into a shallow hole or planting slit.

U = Unidentified—Usually for tallying trees that died from unknown causes such as insects, disease, or unknown stresses.

X = Improper Angle—this is the tree that has a root system which exceeds 45 degrees from the vertical. BE CAREFUL to check trees that appear to lean above ground to be sure that the lean continues below the ground. Many times, in machine planting, a dirt clog will cause the stem to bend over temporarily above ground while the roots remain within vertical tolerances.

REFERENCE

Lantz, Clark W.; Kraus, John F. A guide to southern pine seed sources. 1987. General Technical Report SE-43. Asheville, NC: U.S. Department of Agriculture, Forest Service, Southeastern Forest Experiment Station; 34 p.

CRP PLANTING REVIEW FORM

R08CRP-

CASE NO. _______________
STATE _______________
COUNTY _______________
LANDOWNER _______________
ACRES _______________
SEED SOURCE _______________
SPECIES _______________
FORESTER _______________

DATE REVIEWED ___/___/___
DATE DELIVERED ___/___/___
DATE PLANTED ___/___/___
HANDLING (OK) Y N
FIELD PRUNING Y N
TRAINED VENDOR Y N
RELEASE NEEDED Y N
PREWORK CONFER. Y N

RX TR/ACRE (_____)

INSPECTED Y N
RX FOLLOWED Y N
MACHINE PLANTING Y N
HOEDAD PLANTING Y N
DIBBLE PLANTING Y N
CONTOUR PLANTING Y N
ADEQUATE SITE PREP Y N
SUBSOING NEEDED Y N
SUBSOILED Y N

above ground defects
C = CULL SEEDLINGS
D = DEBRIS IN HOLES
E = TO DEEP
M = MORE THAN ONE TREE
N = TO LOOSE
S = SHALLOW PLANTED
U = UNIDENTIFIED
X = LEANING > 45 DEGRE
0 = OTHER

below ground defects
J = J OR U ROOTED
L = L ROOTED
T = TWISTED OR BALLED
X = LEANING > 45 DEGREE
D = DEBRIS IN HOLE
✓ = OK

REMARKS: ____
____
____
____
____
____

		<--- above ground tally --->										<below ground>			
PLOT NO.	NATURAL TREES	UNSATISFACTORY TREES									SATISFACTORY	EXCAVATED			COMMENTS
		U	D	C	S	E	N	X	M	O					
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															

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Revised 1-19-88

DIRECTIONS

1. On each farm take a minimum of 5 plots or 1 plot per 10 acres not to exceed 10 plots.

2. Plots should be 1/100 th acre circular plots. First dot tally all seedlings on the plot as satisfactory or underneath the appropriate column of above ground defects. NOTE: Check trees that appear to be leaning to be sure the ROOTS exceed 45 degrees from verticle.

3. Excavate three APPARENTLY GOOD trees. Each tree should be close to the plot center but from a different row. (One of the trees may not fall in the plot.) Check the box if satisfactory if not list the appropriate code letter.

ABOVE GROUND DEFECTS

U - Unidentified cause of death
D - Debris, grass, leaves, or other material in the planting hole or furrow.
C - Cull seedlings:
    Top less than 5 inches
    Root collar diameter less than 1/8 inch
    Lacking secondary needles
S - Shallow seedling (not planted deep enough)
    Root collar above ground
    Roots showing above ground
E - Excessively deep seedling (planted too deep)
    Terminal bud less than 3 inches from ground
N - Not packed properly
    Too loose - failed 4 needle test
    No second dibble hole
    Top of planting hole not closed
    Bottom of the planting furrow not closed
    Seedling pushed over by packing wheels
M - More than one seedling in the hole.

BELOW GROUND DEFECTS

I - Improper planting angle of the root system - greater that 45 degrees from the vertical
J - J rooted seedling
L - L rooted seedling
T - Twisted or balled roots
C - Cull seedlings - taproot is less than 5 inches in length
D - Debris in hole. May also be used for burried seedlings

PEST PROBLEMS (note in unheaded column)

A - Ants
B - Browsing
F - Fusiform rust
M - Tip moth damage
W - Pales weevil damage
Z - Mechanical or other damage

AT THE NURSERY

Is container dated?	Y	N
Instructions on or with?	Y	N
Seedlings in good condition?	Y	N
No. of plantable seedlings	______	
No. of standard culls	______	
*** No. of LRD samples	______	
Total seedlings in bundle	______	
Are seedlings precooled	Y	N
Shipped refrigerated?	Y	N
Shipped insulated?	Y	N
Shipped in open trucks?	Y	N

AT THE PLANTING SITE (If available)

Date shipped	__/__/__	
Measured bag temperature	________	
Seedlings rotated (first in first out system)?	Y	N
Stacked less than 3 high?	Y	N
Seedlings refrigerated?	Y	N
Seedlings insulated?	Y	N
Seedlings shaded?	Y	N
Seedlings in open sun?	Y	N

*** LRD (Lateral Roots Deficient) = Trees not having 4 primary lateral roots that are 1mm or larger.

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The Forest Service, U.S. Department of Agriculture, is responsible for Federal leadership in forestry. It carries out this role through four main activities:

- Protection and management of resources on 191 million acres of National Forest System lands.
- Cooperation with State and local governments, forest industries, and private landowners to help protect and manage non-Federal forest and associated range and watershed lands.
- Research on all aspects of forestry, rangeland management, and forest resources utilization.
- Participation with other agencies in human resource and community assistance programs to improve living conditions in rural areas.

The Southern Region

- Represents the National Forest System and the State and Private Forestry branches of the Forest Service in Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, Puerto Rico, South Carolina, Tennessee, Texas, Virginia, and U.S. Virgin Islands.